

# Make Open Access Publishing Fair and Transparent!

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**The scientific publication** landscape has dramatically changed in environmental sciences (and beyond) since the onset of this millennium by two closely interconnected trends: the widespread emergence of online-only journals that drastically reduced the costs for scientific publishers (Van Noorden 2013) and the increasing success of open access (OA) publishing journals (Tennant et al. 2016)—that is, journals that have reversed the revenue generation from a reader-pays to an author-pays approach. In principle, there are four avenues of OA publishing (table 1): An increasing number of journals have been established that solely publish OA (gold OA); the vast majority of these journals are online only. Currently, in ecology and evolutionary biology, 25 of 189 journals included in the 2017 Journal Citation Report by Clarivate Analytics are gold OA journals. A second possibility is to publish an article in a conventional toll-access journal and additionally provide an OA version without journal layout—for example, in a repository (green OA). Third, the authors of many subscription journals can opt to publish an individual article OA (hybrid OA). Finally, anarchistic OA publishing through platforms such as ResearchGate ([www.researchgate.net](http://www.researchgate.net)), Sci-Hub (<https://sci-hub.tw>), or authors' personal webpages that provide free access to a large fraction of scientific output (including non-OA publications), a practice that is often illegal but that has so far been largely tolerated by publishers. In total, it has been estimated that 29% of the publications in environmental sciences archived in the World Wide Web are available OA (Khabisa and Giles 2014).

Open access has become supported by funding agencies, which increasingly require scientific papers resulting from projects they have funded to be made freely accessible. In this context, the recently proposed Plan S ([www.coalition-s.org](http://www.coalition-s.org)), which has been developed by the European Union and several national funding agencies, aims for a rapid transition of scientific publishing to gold and green OA.

A range of arguments in favor of OA publishing are widely accepted: unconstrained access to scientific results for everyone (e.g., researchers, countries, institutions, nonscientists), which is particularly important for academics and stakeholders from low- and medium-income countries and for practitioners without access to scientific evidence that was locked behind paywalls; the facilitation of knowledge syntheses, including those conducted by the IPCC ([www.ipcc.ch](http://www.ipcc.ch)) or the IPBES ([www.ipbes.net](http://www.ipbes.net)); automated extraction of information from scholarly research via text and data mining, allowing for analyses at a massive scale (Glennison et al. 2005); the facilitation of evidence uptake by decision-makers and the wider public; and contributions to closing the gap separating the wider public from the scientific community (Tennant et al. 2016).

## Open access publishing: Has it delivered what it promised?

Although OA publishing has undoubtedly brought these gains, it also entails risks that are not fully appreciated. For example, OA has led to the emergence of a plethora of predatory journals in biology and beyond (Beall 2012). In addition, it introduced financial incentives to maximize the publication output for publishers, thus creating a fundamental conflict of interest. In

cases in which editorial decisions are not fully independent of the economic decisions of the publisher, there is a risk of lowering standards of scientific scrutiny and peer review before the acceptance of manuscripts.

Although an increasing number of funding agencies urge or require OA publishing (Schlitz 2018, van Noorden 2018), the substantial costs of OA publications that authors have to incur are often not fully covered. For instance, the Austrian Science Foundation has established a limit of a maximum of €2500 for gold OA and of €1500 for hybrid OA that will be provided to authors to cover OA publication costs ([www.fwf.ac.at/de/forschungsfoerderung/open-access-policy](http://www.fwf.ac.at/de/forschungsfoerderung/open-access-policy)), which is well below what many OA journals request per article. The German Research Foundation currently provides €750 per project year for publication costs; therefore, for a typical 3-year project, only about one OA publication is covered. Although they are insufficient, these funds dedicated to cover OA publishing costs redirect money from science foundations that would otherwise have been available for funding science (Poynder 2019).

Indeed, the article processing charges for journals with high-impact factors in environmental sciences are often staggeringly high. For instance, *PLOS ONE* asks for US\$1595 per article, *PLOS Biology* for US\$3000, *Nature Communications* for US\$5200 (€4290 in Europe, plus VAT or local taxes where applicable), and *Science Advances* for US\$4,500. If these article-processing charges are not (or only partly) covered by funding agencies, they may be prohibitive—in particular for researchers from low- and medium-income countries (Schlitz 2018). For the latter, waivers are neither systematically nor

**Table 1. Key characteristics of the four avenues of OA publishing, and their advantages (+) and disadvantages (–) for the wider public, authors, publishers, and funding agencies compared with conventional toll-access publishing.**

	Gold OA		Green OA		Hybrid OA		Anarchistic OA	
	+	–	+	–	+	–	+	–
Wider public	Higher accessibility	Difficulties to identify predatory journals, potential for conflicts of financial versus editorial interests	Higher accessibility	Difficulties to locate repositories	Higher accessibility, but only for articles published OA	Some publications behind a paywall, potential for conflicts of interest	Higher accessibility	Legal concerns; not supported by publishers, no centralized availability and not systematically updated
Authors	Higher visibility, larger readership and higher citation rate	Expensive, lack of transparency for waivers	Higher visibility, larger readership and higher citation rates	Legal concerns	Higher flexibility for authors, because more journals to choose from; higher citation rates of OA articles compared to non-OA articles in the same journal	Expensive, lack of transparency for waivers	Free and flexible (e.g., authors can host their full publishing record on one website), higher visibility, larger readership and higher citation rate	Legal concerns, lower accessibility
Publishers	Secure and rapid revenue as payment of OA publishing charge is due on acceptance	No subscription fees possible	None	Possibly reduced revenue, because manuscripts are accessed via freely available websites	Higher flexibility, OA papers are paid twice (double-dipping)	None	None	Possibly reduced revenue, because manuscripts are accessed via freely available websites
Funding agencies	Possibly cheaper, because authors pay OA publishing processing charge, co-benefits such as easier access to scientific results	Possibly more expensive because of refunding of author publication costs	Co-benefits such as easier access to scientific results	Toll-access journal fees still apply	Co-benefits such as easier access to scientific results	More expensive, because OA publication processing charges and toll-access journal fees apply (double-dipping)	Co-benefits such as easier access to scientific results	Legal concerns

*Note:* Gold OA refers to journals publish only OA. Green OA refers to articles available OA on repository after publication in toll-access journal. Hybrid OA refers to subscription journals that have some OA articles in their issues. Anarchistic OA refers to noninstitutional or nonlegal OA platforms.

transparently given—potentially establishing a kind of academic imperialism (Burgman et al. 2019). Although solid estimates remain scarce, it is generally assumed that these fees are disproportionate to the actual article processing costs. For example, the average revenue per article of the science-publishing industry is estimated at approximately US\$5000, generating about US\$10 billion in yearly revenue (Schimmer et al. 2015). In comparison, the cost is estimated to be around US\$3000 per subscribed article and between US\$70 to US\$200 per OA article (Brembs 2015), implying in all cases a striking

profit for publishers at the expense of research and tax payers. In essence, in many cases, OA has put additional financial burdens on authors, whereas publishers have adapted to the changing environment, without losing their superior negotiating position or their excessive benefits. Particularly beneficial for publishers is the hybrid OA model described above, in which they receive subscription fees and additionally cash in OA fees (double-dipping; Jeschke et al. 2019). In a nutshell, OA has not lived up to the expectation that it would reverse the flow of public money to private publishers—that is,

effectively subsidizing publishers with tax money.

### Establishing a safe operating space for OA

For making OA truly fair—that is, inclusive, affordable, transparent, and the role model of scientific publishing for the future—such deficiencies need to be resolved. We believe addressing these issues has become particularly important and timely. First, there are emerging discussions on novel ways of disseminating scientific results (Diamond OA, Fuchs and Sandoval 2013) and second, large initiatives such

**Table 2. Five elements that we consider necessary to ensure a safe operating space for the future of OA publishing.**

Recommendation	Justification and added value	Necessary steps	Responsibility
Establish widely accepted agreements on essential OA standards	Accepted criteria on a range of central aspects of OA are highly needed	Develop, agree on and promote criteria that should set widely accepted standards	Funding agencies, OA publishers, scientists, academic institutions
Encourage authors not to publish in OA journals that do not fulfill the OA standards, and monitoring publishing in predatory OA journals	Reducing publications in OA journals that do not meet criteria is vital to improve the value and acceptance of OA publishing	Develop, establish and promote standards and procedures for tracking publications in predatory OA journals	Funding agencies, scientists, academic institutions
Improve recognition of the work of editors and reviewers for OA journals	Providing incentives via discounts or waivers for future publications in OA journals	Establish a system that monitors editorial and reviewing work, and that results in improved recognition (e.g., waivers for future OA publications)	OA publishers, scientists
Establish international bodies for OA publishing authors and funding agencies	Improve the negotiating position of OA authors and funding agencies	Develop and establish international bodies that represent OA authors and funding agencies (e.g., International Union of Funding Agencies, International Interest Group of OA Publishing Authors)	Funding agencies, OA publishers, scientists, academic institutions
Establish a Global OA Partnership	Establish a body that oversees the development and implementation of global standards of OA publishing, and to handle appeals if OA standards are not met	Establish a partnership that represents the different relevant actors and institutions in OA publishing	Funding agencies, OA publishers, scientists, academic institutions

as Plan S aim to make OA publishing mandatory for publications they have funded. If implemented, Plan S may have a transformative impact on scientific publishing. We believe that several key points and potential solutions have not received appropriate attention and are also not yet adequately included in Plan S. We consider five key issues particularly relevant (table 2).

First, those institutions and stakeholders (e.g., publishers, science funders, scientists) that have a vital interest in OA should strive for a joint agreement that settles key questions and provides guidance (similar to the DORA declaration, <https://sfedora.org>). Such an agreement should take into account the 10 principles of Plan S ([www.coalition-s.org/10-principles](http://www.coalition-s.org/10-principles)), but we believe that a broader discussion is needed that considers legitimate concerns of all parties involved—that is, authors (e.g., NN 2018, Burgman et al. 2019), users, funding agencies, publishers, referees, and editors. It should explicitly address the question of appropriate costs of OA publishing and should recommend benchmarks for author charges. On the other hand, funding agencies should agree on covering the

full costs of OA publishing that are in line with these recommendations. In addition, clear principles how waivers are provided to researchers that do not have the necessary funds for covering OA costs should be established. Both these principles and their implementation should be transparent. As part of such an agreement, standards that allow for identifying high quality and predatory OA journals should be agreed on. Such a whitelist approach could expand the Directory of Open Access Journals (<https://doaj.org>), whereas the complementary blacklist approach could expand and continue the privately established Beall's List of Predatory Journals and Publishers (<https://beallslist.net/>, Beall 2015). Recently, the Chinese government has announced that it will create such a national blacklist of journals that it considers poor quality or those seeking excess profit (Cyranoski 2018). Furthermore, OA agreements between publishers and funding agencies should be fully transparent by making the terms of agreements public. Nondisclosure agreements—which are often requested by publishers—are incompatible with such an approach, because they create an environment in

which pricing is opaque, and everyone except the publishers is put at a disadvantage (Poynder 2019).

Second, there should be additional incentives for authors to publish in journals that fulfill the criteria (including a full refund of OA publishing processing charges also for publications not funded by project money), and funding institutions should routinely check whether publications that have arisen from projects they have funded have been published in predatory journals. Such an approach should also consider the possibility of penalties for authors when violating established criteria.

Third, the role of academic editors and reviewers has to be reconsidered. Both usually serve the scientific community in kind, and the rapid increase of publication output in most fields of scientific inquiry has brought this system to a limit. We argue that increased efforts are necessary to better acknowledge the crucial roles that reviewers and academic editors have. This problem has been started to be addressed by initiatives such as Peercommunity (<https://peercommunityin.org>) and Publons (<https://publons.com>), which provide visibility to reviewers. However, Publons is

owned by Clarivate, which means a commercial company with a financial interest in collecting these valuable data. We believe that the steps taken so far fall short of addressing the full scale of the challenge that services provided by reviewers and editors (typically without costs for the publisher) have become a critical bottleneck for scientific publishing. Most of us believe that fully paying the work of reviewers and editors would have unintended side effects, but we suggest doing such work for OA journals should be acknowledged by providing adequate discounts or waivers for future publications in these journals. In any case, it would certainly be fruitful to conduct a deep reflection on what type of rewards for this free work for benefit-based companies would be adequate while devoid of side effects.

Fourth, to counterbalance the increasing negotiating power on the side of OA publishers (which deal with individual authors rather than large institutions), we suggest that the negotiating partners of the publishers unite, for example, at a national (or even higher, such as the European Union) level. Such an approach has recently been taken up by universities and research institutes for negotiating with large conventional publishers (e.g., Projekt DEAL in Germany, [www.projekt-deal.de](http://www.projekt-deal.de)). Building on these experiences, we advocate the idea of establishing an international union of funding agencies (which could be established by expanding cOAlition S, which backs Plan S) and an international interest group of OA publishing authors, which would allow for negotiating more equitable terms with OA publishers.

Fifth and finally, a global OA partnership should be established. We believe that cOAlition S could serve as a nucleus for developing such a broad partnership, which should incorporate the relevant actors in the field and whose governance structure should reflect the diversity of interests. Its governance structure should be equitable, transparent, and accountable. Its primary role should be to oversee

the development and implementation of global standards regarding OA publishing, and it should be open to appeals if OA standards are not met. Establishing such a partnership is a delicate and ambitious task and will demand substantial commitment and leadership of interested parties. We should now take the first steps toward this longer-term goal.

## Conclusions

Open access publishing has entered a phase of disillusion. Hopes of contributing to a democratization of society have only been realized to a limited extent, and unexpected developments have shown to be able to undermine these. We believe that agreeing on and establishing standards for OA publishing that appropriately reflect the legitimate interests of all actors—including those of scientists—is necessary to ensure that OA publishing can live up to widely held expectations. We acknowledge that our suggestions to address these problems are ambitious; progress will be incremental and needs to be adaptive and responsive to challenges; in doing so, goals that are currently out of reach will become achievable.

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